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British Standard Institution
Report

No. 53—1913.

British Engineering Standards Association.

(*Incorporated 1918.*)

FORMED IN 1901 AS THE ENGINEERING STANDARDS COMMITTEE
BY
THE INSTITUTION OF CIVIL ENGINEERS.
THE INSTITUTION OF MECHANICAL ENGINEERS.
THE INSTITUTION OF NAVAL ARCHITECTS.
THE IRON AND STEEL INSTITUTE.
THE INSTITUTION OF ELECTRICAL ENGINEERS.

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BRITISH STANDARD SPECIFICATION FOR COLD DRAWN WELDLESS STEEL TUBES FOR LOCOMOTIVE BOILERS.

(REVISED AUGUST, 1913.)

LONDON:
PUBLISHED FOR THE ASSOCIATION BY CROSBY LOCKWOOD & SON,
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June, 1918.

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CONTENTS.

PAGE

List of Members of Main Committee 3

List of Members of Sectional Committee on Locomotives... 4

List of Members of Sectional Committee on Railway Rolling Stock Underframes 4

List of Members of Sub-Committee on Iron for Railway Rolling Stock 4

Preface to First Edition 5

Preface to Second Edition 5

SPECIFICATION: TABLE OF CLAUSES.

1. Quality of Material 7

2. Freedom from Defects 7

3. Annealing 7

4. Permissible Variation in Weight... 7

5. Mechanical Tests 7

6. Tensile Test 8

7. Bulging Test 8

8. Crushing down Test 8

9. Flattening Test 8

10. Hydraulic Test 8

11. Additional Tests before Rejection 8

12. Inspection 9

13 Testing Facilities 9

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† Succeeded the late SIR JOHN WOLFE BARRY, K.C.B., February, 1918.

BRITISH ENGINEERING STANDARDS ASSOCIATION.

The following are Lists of Members of the Sectional Committees on Locomotives and on Railway Rolling Stock Underframes and of the Sub-Committee on Iron for Railway Rolling Stock which was entrusted with the drafting of the following Specification.

SECTIONAL COMMITTEE ON LOCOMOTIVES.

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India Office, *Mr. G. V. Martyn.

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Association of Railway Locomotive Engineers, Mr. G. J. Churchward (*Great Western Railway*); Mr. G. H. Hughes (*Lancashire and Yorkshire Railway*).

Steel Ingot Makers' Association, Mr. Maxmilian Mannaberg (*Frodingham Iron and Steel Co., Ltd.*).

Steel Founders' Association of Great Britain, Sir Robert Hadfield (*Hadfield's Steel Foundry Co., Ltd.*).

Mr. F. Wolley-Dod (*Chairman Calcutta Conference,* 1901) ; †Sir John Wolfe Barry, K.C.B. ; Mr. G. Ainsworth (*Consett Iron Co., Ltd.*); †Mr. H. C. Arbuthnott (*Taylor Brothers & Co., Ltd.*) ; Mr. J. Hartley Bibby (*John Bibby, Sons & Co.*) ; Mr. D. Cassels (*Steel Company of Scotland, Ltd.*) ; Mr. W. Collingwood (*Vulcan Foundry, Ltd.*) ; Mr. J. M. Dobson (*Hawkshaw & Dobson*) ; Mr. J. Duncan Elliot (*Carruthers & Elliot*); Mr. F. C. Fairholme (*Thomas Firth & Sons, Ltd.*) ; Mr. C. N. Goodall (*Robert Stephenson & Co., Ltd.*) ; Mr. E. Greg, Junr. (*Nasmyth, Wilson & Co., Ltd.*) ; Mr. A. F. Halstead (*Beyer, Peacock & Co., Ltd.*) ; Mr. Cyril Hitchcock (*Sir George Bruce & White*) ; Mr. Bradford Leslie (*Vickers, Ltd.*) ; Mr. Edward Mills (*Williams, Foster & Co.* and *Pascoe, Grenfell & Sons, Ltd.*) ; Mr. Frederick Tomlinson (*Broughton Copper Co., Ltd.*) ; Mr. Seymour B. Tritton (*Rendel, Palmer & Tritton*); Mr. Robert White (*Sir George Bruce & White*).

* Succeeded Mr. A. Brereton, C.S.I., April, 1913. † Since deceased.

SECTIONAL COMMITTEE ON RAILWAY ROLLING STOCK UNDERFRAMES.

August, 1913.

Chairman, SIR DOUGLAS FOX.

Crown Agents for the Colonies, Mr. G. L. Eyles, C.M.G. ; Mr. Ashton M. Heath.

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† Since deceased.

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August, 1913.

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India Office, Mr. W. E. Phelps, I.S.O.

Crown Agents for the Colonies, Mr. Ashton M. Heath.

Locomotive Manufacturers' Parliamentary Association, Mr. Hugh Reid.

Railway Companies' Association, Mr. J. F. McIntosh, M.V.O.

Association of Railway Locomotive Engineers, Mr. G. J. Churchward.

Scottish Tube Association, Mr. J. G. Stewart.

British Tube Association, Mr. A. W. Hutton.

†Mr. H. C. Arbuthnott (*Taylor Brothers & Co., Ltd.*) ; Mr. D. Bain (*Midland Railway*) ; Mr. Lincoln Chandler (*Metropolitan Carriage, Wagon & Finance Co., Ltd.*) ; Mr. W. Collingwood (*Vulcan Foundry, Ltd.*); Mr. George Hatton (*Earl of Dudley's Round Oak Works, Ltd.*) ; Mr. Cyril Hitchcock (*Sir George Bruce & White*) ; Mr. Adam S. Jardine (*Scottish Iron & Steel Co., Ltd.*) ; Mr. R. Lowndes (*John Bradley & Co.*) ; Mr. H. J. Skelton (*H. J. Skelton & Co., Ltd.*) ; Mr. Seymour B. Tritton (*Rendel, Palmer & Tritton*) ; Dr. W. C. Unwin ; Mr. Robert White (*Sir George Bruce & White*).

† Since deceased.

PREFACE TO FIRST EDITION.

The Sectional Committee on Locomotives was appointed at the Meeting of the Main Committee held on April 16th, 1902, and the Sectional Committee on Railway Rolling Stock Underframes at the Meeting of the Main Committee held on July 16th, 1901.

The Sub-Committee on Iron for Railway Rolling Stock was appointed by the above Sectional Committees to draw up Standards for the various grades of Wrought Iron used in Railway Rolling Stock. To this Sub-Committee was also entrusted the drafting of a Standard Specification for Charcoal Iron Lapwelded Boiler Tubes. The Sectional Committee on Locomotives having subsequently received a request to prepare a Standard Specification for Steel Boiler Tubes, the drafting of this Specification was remitted to the Sub-Committee on Wrought Iron, upon which the Tube Makers' Associations were already represented.

This Report was adopted by the Sectional Committees on Locomotives and Railway Rolling Stock Underframes at their Joint Meeting held on November 22nd, 1910.

This Report was approved by the Main Committee at their Meeting held on March 16th, 1911.

PREFACE TO SECOND EDITION.

In view of representations which have been made to the Committee that there is a difficulty in obtaining the elongation in test strips cut from large tubes without annealing, it has been decided to allow strips cut from tubes over 2¼ inches in diameter to be annealed before testing.

The Specification in its present form was approved by the Sectional Committees on Locomotives and Railway Rolling Stock Underframes at their Joint Meeting on July 1st, 1913, and by the Main Committee at their Meeting on July 17th, 1913.

NOTE.—*The Association desires to call attention to the fact that this Specification is intended to include the technical provisions necessary for the supply of the material herein referred to, but does not purport to include all the necessary provisions of a Contract.*

BRITISH
STANDARD SPECIFICATION
FOR
COLD DRAWN WELDLESS STEEL TUBES
FOR
LOCOMOTIVE BOILERS.

(REVISED AUGUST, 1913.)

Quality of Material.

1. The Tubes shall be cold drawn and weldless and shall be manufactured from Steel of the best quality made by the Open Hearth process. They must not show on analysis more than 0·03 per cent. of Sulphur or of Phosphorus. The Manufacturer shall supply an analysis when required to do so.

Freedom from Defects.

2. The Tubes must be perfectly sound, well-finished, clean, and free from surface defects and rust, and the ends must be faced clean and square. They must be of the dimensions specified, of uniform thickness, and, unless otherwise specified, of uniform diameter throughout.

Annealing.

3. The Tubes shall be carefully annealed throughout their length after the operation of drawing.

Permissible Variation in Weight.

4. The actual weight of each Tube must not differ from the calculated weight by more than 2½ per cent. below or 5 per cent. above the weight calculated from the specified dimensions, allowing 489 lbs. per cubic foot of metal in the Tubes.

Mechanical Tests.

5. The Manufacturer shall provide, at his own expense, for mechanical testing, in accordance with Clauses 6, 7, 8 and 9, extra Tubes at the rate of two per cent. of each diameter of Tube ordered under the Contract, and the representative of the

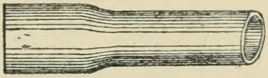
Engineer (or of the Purchaser) shall select and test such of the Tubes as he may think proper, to the extent of such percentage. Should the number of Tubes ordered of any one diameter exceed 400, then for every 100 Tubes or part thereof above that number, one additional tube only shall be provided.

Tensile Test.

6. The Tubes or Strips cut from the Tubes shall without further annealing show a tensile strength of not more than 24 tons per square inch, with an elongation of not less than 28 per cent. in 8 inches. If Strips are cut for testing from Tubes over 2¼ inches diameter they may be annealed before testing.

Bulging Test.

7. The Tubes must when cold stand bulging without showing either crack or flaw until the diameter of the bulged end measures not less than 15 per cent. for Tubes under 11 S.W.G. in thickness, and not less than 12½ per cent. for Tubes 11 S.W.G. to 8 S.W.G. in thickness, greater than the original diameter of the Tube.

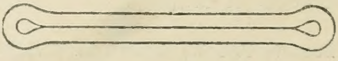


Crushing down Test.

8. A piece of Tube 2 ins. long shall be placed on end and must when cold stand hammering down, until it is reduced to 1⅛ ins. high, without showing either crack or flaw.

Flattening Test.

9. The Tubes must when cold stand flattening without showing crack or flaw until the interior surfaces of the Tubes meet, or, when the Tubes are over 11 S.W.G. in thickness, until the interior surfaces are brought to a distance apart equal to the thickness of the wall of the Tube.



Hydraulic Test.

10. Every Tube shall be tested by an internal hydraulic pressure of at least 1,000 lbs. per square inch, and any Tubes failing to stand this test will be rejected.

Additional Tests before Rejection.

11. Should a Tube selected for testing purposes, in accordance with Clause 5, show definite signs of failure in any one or more of the tests specified in Clauses 6, 7, 8 and 9, the batch of Tubes represented shall be re-annealed and then re-tested in accordance with the above clauses, and if the repeat tests are satisfactory the Tubes shall be accepted, if in other respects they fulfil the conditions of the Specification, but if definite defects are again shown, the batch of Tubes which the test pieces represent shall be rejected.

Inspection.

12. The representative of the Engineer (or of the Purchaser) shall have free access to the works of the Manufacturer at all reasonable times ; he shall be at liberty to inspect the manufacture at any stage and to reject any material that does not conform to the terms of this Specification.

Testing Facilities.

13. The Manufacturer shall, at his own cost, furnish and prepare the necessary test pieces, and supply labour and appliances for such testing as may be carried out on his premises in accordance with this Specification. Failing facilities at his own works for carrying out the prescribed tests, the Manufacturer shall bear the cost of carrying out the tests elsewhere

British Engineering Standards Association.

PRICE LIST
OF
BRITISH STANDARD SPECIFICATIONS AND REPORTS.

NOVEMBER, 1919.

(This List cancels all previous Lists.)

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